

SYSTEM AND METHOD FOR SAMPLE DETECTION  
BASED ON LOW-FREQUENCY SPECTRAL COMPONENTS

ABSTRACT OF THE DISCLOSURE

Method and apparatus for detecting a selected material in a sample are disclosed. In the method, the sample is placed adjacent a detector coil, for generating an electromagnetic time-domain signal composed of sample source radiation. The signal is first conditioned to convert the signal to an amplified conditioned signal from which frequency components above a selected frequency have been removed, then filtered to selectively pass low-frequency spectral components that are (i) in a frequency range between dc and 50khz, and (ii) characteristic of the selected material. The filtered signal is cross-correlated with a data set of low-frequency spectral components that are (i) in a frequency range between dc and 50khz, and (ii) characteristic of a selected material, to produce a frequency-domain spectrum in the frequency range within DC to 50khz. This spectrum is then used to determine whether the frequency-domain spectrum contains one or more low-frequency signal components that are characteristic of the selected material, and diagnostic of the presence or absence of such material in the sample.